NCERT Class 7 Solutions: Integers (Chapter 1) Exercise 1.3 – Part 2

Q-3

1. For any integer a, what is $(-1) \times a$ equal to?
2. Determine the integer whose product with (-1) is:
3. -22
4. 37
5. 0

Solution:

Properties of Multiplication

Commutative Property: When two numbers are multiplied together, the product is the same regardless of the order of the multiplicands. For example $4 \times 2 = 2 \times 4$

Associative Property: When three or more numbers are multiplied, the product is the same regardless of the grouping of the factors. For example $(2 \times 3) \times 4 = 2 \times (3 \times 4)$

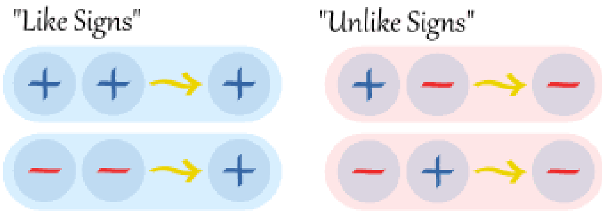
Multiplicative Identity Property: The product of any number and one gives us that number. For example $5 \times 1 = 5$.

The Multiplication Property of Zero: Zero has a unique rule called the multiplication property. The multiplication property states that the product of any number and zero is zero. Any number, integer, real, rational, irrational, when multiplied by zero, gives us zero as the answer.

Distributive Property: The sum of two numbers times a third number is equal to the sum of each addend times the third number. Multiplication is said to be distributive over addition. For example $4 \times (6 + 3) = 4 \times 6 + 4 \times 3$.

Multiplicative Inverse and Multiplicative Identity: A multiplicative inverse or reciprocal for a number , denoted by $\frac{1}{x}$ or x^{-1} , is a number which when multiplied by x yields the **multiplicative identity**, 1. The multiplicative inverse of a fraction $\frac{a}{b}$ is $\frac{b}{a}$. For the multiplicative inverse of a real number, divide 1 by the number.

Signs in Multiplication



1. $(-1) \times a = -a$ (-ve × + ve =-ve)
2. Solutions:
3. $\underline{22} \times (-1) = -22$ (+ ve × -ve =-ve)
4. $\underline{(-37)} \times (-1) = 37$ (-ve × -ve =+ ve)
5. $\underline{0} \times (-1) = 0$ (Multiplication property of zero)

Q-4 Starting from $(-1) \times 5$, write various products showing some pattern and demonstrate that $(-1) \times (-1) = 1$

Solution:

- $1 \times 5 = -5$

  $-1 \times 4 = -4 = -5 + 1$

  $-1 \times 3 = -3 = -4 + 1$

  $-1 \times 2 = -2 = -3 + 1$

  $-1 \times 1 = -1 = -2 + 1$

  $-1 \times 0 = 0 = -1 + 1$

Note that this proves the consistency of the pattern and how rules of multiplication and addition allow us to reach this consistency. However this should not be taken as a proof of such properties.

Q-5 Find the product, using suitable properties:

1. $26 \times (-48) + (-48) \times (-36)$
2. $8 \times 53 \times (-125)$
3. $15 \times (-25) \times (-4) \times (-10)$
4. $(-41) \times 102$
5. $625 \times (-35) + (-625) \times 65$
6. $7 \times (50 - 2)$
7. $(-17) \times (-29)$
8. $(-57) \times (-19) + 57$

Solution:

PROPERTIES OF ADDITION AND MULTIPLICATION				
	ADDITION	*EXPLANATION*	*MULTIPLICATION*	*EXPLANATION*
COMMUTATIVE PROPERTY	a + b = b + a 22 + 5 = 5 + 22 27 = 27	THE ORDER OF THE ADDENDS DOESN´T CHANGE THE SUM	a x b = b x a 3 X 7 = 7 X 3 21 = 21	THE ORDER OF THE FACTORS DOESN´T CHANGE THE PRODUCT
ASSOCIATIVE PROPERTY	(a + b) + c = a + (b + c) 14 +(5 + 7) = (14 +5)+7 14 + 12 = 19 + 7 26 = 26	CHANGING THE GROUPING OF THE ADDENDS DOESN´T CHANGE THE SUM	(a x b) x c = a x (b x c) (4x 5) x 6 = 4 x (5 x 6) 20 x 6 = 4 x 30 120 = 120	CHANGING THE GROUPING OF THE FACTORS DOESN´T CHANGE THE PRODUCT
IDENTITY PROPERTY	a + 0 = a 6 + 0 = 6	THE SUM OF A NUMBER AND O IS THE NUMBER	a x 1 = a 4 x 0 = 0	THE PRODUCT OF A NUMBER AND 1 IS O.
PROPERTY OF ZERO OR ELEMENTO NEUTRO	236 + 0 = 236			
ZERO PROPERTY OF MULTIPLICATION	--------------------	----------------	a x 0 = 0 4 x 0 = 0	THE PRODUCT OF O AND A NUMBER IS O.
DISTRIBUTIVE PROPERTY OF ADDITION AND MULTIPLICATION	a x (b + c) = (a x b) + (a x c) 3 x (6+8) = (3 x 6) + (3 x 8) 3 x 14 = 18 + 24 42 = 42		THE PRODUCT OF A FACTOR AND A SUM IS EQUAL TO THE SUM OF THE PRODUCTS.	

1. $26 \times (-48) + (-48) \times (-36)$

$= (-48) \times 26 + (-48) \times (-36)$ (Commutative property of addition, $a + b = b + a$)

$= (-48) \times [46 - 36]$ (Distributive property of multiplication over addition $a \times (b + c) = a \times b + a \times c$)

$= (-48) \times (-10)$

$= 480$

1. $8 \times 53 \times (-125)$

We know that numbers with 0s are easier to multiply so, first take the product of 8 (an even number) and 125.

$= 8 \times [53 \times (-125)]$

$= 8 \times [(-125) \times 53]$ (Commutative property of multiplication, $a \times b = b \times a$)

$= [8 \times (-125)] \times 53$ (Associative property $(a \times b) \times c = a \times (b \times c)$)

$= [-1000] \times 53$

$= -53000$

1. $[15 \times (-25)] \times (-4) \times (-10)$, again we know that product of 25 and 4 is 100.

$= [15 \times [(-25) \times (-4)]] \times (-10)$ (Associative property $(a \times b) \times c = a \times (b \times c)$)

$= [15 \times [100]] \times (-10)$

$= 15 \times [[100] \times (-10)]$ (Associative property $(a \times b) \times c = a \times (b \times c)$)

$= 15 \times (-1000)$

$= -15000$

1. $(-41) \times 102$

$= (-41) \times (100 + 2)$

$= (-41) \times 100 + (-41) \times 2$ (Distributive property, $a \times (b + c) = a \times b + a \times c$)

$= -4100 - 82$

$= -4182$

1. $625 \times (-35) + (-625) \times 65$

$= 625 \times [(-35) + 65]$ (Distributive property, $a \times (b + c) = a \times b + a \times c$)

$= 625 \times [-100]$

$= -62500$

1. $7 \times (50 - 2)$

$= (7 \times 50) - (7 \times 2)$ (Distributive property, $a \times (b + c) = a \times b + a \times c$)

$= 350 - 14$

$= 336$

1. $(-17) \times (-29)$

$= (-17) \times (-30 + 1)$

$= (-17) \times (-30) + (-17) \times 1$ (Distributive property, $a \times (b + c) = a \times b + a \times c$)

$= 510 + (-17)$

$= 493$

1. $(-57) \times (-19) + 57$

$= (57) \times (19) + 57 \times 1$ (1 is the multiplicative identity)

$= 57 [19 + 1]$ (Distributive property, $a \times (b + c) = a \times b + a \times c$)

$= 57 \times 20$

$= 1140$